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Patent Application

of

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and

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for

TOY GUN FOR PRODUCING FOG FILLED BUBBLES

Cross Reference to Related Applications

[0001] The present invention claims the benefit of priority under 35 U.S.C. § 119(e) to United States Provisional Patent Application Number 60/457,111 of John La Fata, entitled "COLORED SCENTED SMOKE FILLED BUBBLES ("BUBBLE PUFFS TM")", filed on March 25, 2003, the entire contents of which is herein incorporated by reference.

Field of Invention

[0001] The present invention relates to a device for forming bubbles having fog or smoke encased therein. More particularly, the present invention relates to a toy for producing bubbles having fog or smoked encased therein and is adapted to vary the size of the bubbles and the rate at which the bubbles are produced.

Background of the Invention

[0002] A variety of devices have been designed for producing one or more bubbles, either simultaneously or in succession. Examples range from simple mechanical rings which are dipped into a soapy liquid, then passed through the air to generate a succession of bubbles, to complicated automatic bubble-making devices for automatically producing hundreds of bubbles.

[0003] Additionally, various devices have been developed which include some form of a smoke-generating device. Examples include toy trains and toy boats wherein a small amount of smoke is generated within a smoke stack of the toy for producing the illusion of self-propulsion.

[0004] Additionally, U.S. Patent No. 5,205,771 to Sims discloses a device that pumps gas through a conduit to inflate film into a bubble. A smoke-generator is also connected to the conduit and fills the conduit with smoke while the film is being inflated, so that the smoke fills the resulting bubble or balloon.

[0005] Also, U.S. Patent No. 2,912,790 to Weeber discloses a bubble producing toy that blows bubbles in such a manner so that when a bubble bursts, smoke is given off. This is accomplished using a heating element to heat up a conventional smoke solution, thereby vaporizing the smoke solution. Air is then blown through the toy and picks up the smoke, which is then blown across a soap film on a ring, forming the bubbles with the smoke entrained therein.

[0006] However, none of the conventional devices produce variable sized bubbles that can be dispensed at a various rates. Additionally, none of the conventional devices have chambers or reservoirs for the smoke solution that can be inverted without spilling the solution.

Summary of the Invention

[0007] It is an object of the present invention to provide a toy for producing various sized bubbles.

[0008] It is a further object of the present invention to provide a toy for producing a stream of relatively small vapor filled bubbles or a few relatively large vapor filled bubbles.

[0009] It is another object of the present invention to provide a toy for producing smoke that can be encased within a bubble or emitted from the toy in any other manner desired.

[0010] It is yet a further object of the present invention to provide a toy for producing vapor or smoke filled bubbles having a system that does not allow significant spillage of a smoke solution, even when the toy is completely inverted.

[0011] The objects of the present invention are obtained by a smoke producing toy, including a compressible chamber adapted to receive a liquid and having an opening therein, a heating element at least partially received in the opening, a member adjacent to the compressible chamber, and an activating device coupled to the member. Whereby when the toy is activated using the activating device, the member moves and compresses the chamber, thereby forcing the liquid through the opening and past the heating element, which in turn heats the liquid and turns the liquid to vapor.

[0012] The objects of the present invention are further obtained by a toy for producing bubbles, including a reservoir adapted to hold a fluid and having an opening therein. A heating element is adjacent the opening and is adapted to heat the fluid and thereby turn the fluid into a vapor. A bubble forming mechanism is adapted to be substantially covered by a film, and a fan is adapted to move the vapor though the bubble forming mechanism at a first velocity or a second velocity.

[0013] Additional features and advantages of the present invention are described in, and will be apparent from, the following Detailed Description of the Invention and the figures.

Brief Description of the Figures

[0014] Referring to the drawings which form a part of this disclosure:

[0015] Fig. 1 is a top perspective view of a toy bubble gun in accordance with the preferred embodiment of the present invention;

[0016] Fig. 2 is an elevational side view of the toy bubble gun of Fig. 1;

[0017] Fig. 3 is an elevational side view of the toy bubble gun of Fig. 2, with a portion of the housing cover removed;

[0018] Fig. 4 is an elevational side view of the heating element used in the toy bubble gun of Fig. 3;

[0019] Fig. 5 is an elevational front view of the toy bubble gun of Fig. 1 with the bubble ring positioned down and in contact with the bubble film;

[0020] Fig. 6 is an elevational front view of the toy bubble gun of Fig. 5 with the bubble ring positioned for producing bubbles;

[0021] Fig. 7 is bottom rear perspective view of the toy bubble gun of Fig. 1;

[0022] Fig. 8 is a bottom side perspective view of the toy bubble gun of Fig. 1; and

[0023] Fig. 9 is a schematic of a second embodiment showing the operation of the vapor generating system.

Detailed Description of the Invention

[0024] Figs. 1-3 illustrate a toy bubble gun 10 according to a preferred embodiment of the present invention. The gun 10 preferably has a plastic housing 12 that is formed of a first half or portion 14 and a second half or portion 16. The two halves 14 and 16 preferably encase at least a portion of the bubble and smoke or vapor making mechanisms and are coupled together using screws. The gun 10 includes a base 18, a handle 20 and a barrel section 22. The barrel section 22 has a main portion 24 and a pivotal portion 26. However, it is noted that the gun can have any shape or configuration desirable and can be formed from any suitable material.

[0025] As shown in Figs. 3, 7 and 8, the base portion has a substantially flat surface 28, with a door 30 that allows access to battery compartment 32. Substantially flat surface 28 is relatively wide, with respect to the handle 20 and long enough to provide a stable base for the gun 10. In other words, the base allows the gun 10 to be placed on a surface (not shown), such as a table or the ground, in an upright position without falling over. Extending through the housing 12 at the rear portion 38 of the base portion is a switch 35. Switch 35 can be any type of switch desired. For example, as shown in the preferred embodiment, switch 35 is a slide switch; however the switch 35 can be any suitable switch, such as a button or toggle or any other suitable switch.

Additionally, switch 35 can be located on any portion of the base or on any other area of toy gun 10 and do not necessarily need to be positioned on the base.

[0026] As shown in Figs. 1 and 2, handle 20 is sized and configured to be held in the palm of one hand and grip portion 34 can be textured for improved feel, if desired. Beginning at end 36, handle 20 extends from the rear portion 38 of the base 18 at preferably an angle slightly less than perpendicular. End 40 of handle 20 is coupled to the barrel section 22. However, handle 20 can be any configuration desired and does not necessarily need to extend from the base at an acute angle.

[0027] Main portion 24 is preferably generally elliptical in shape and has a trigger or activating device 42 extending therefrom. The trigger or lever arm 42 is generally slidable from a first position 44 (Fig. 1) to a second position 46 (Fig. 2). As shown in Fig. 1, main portion 24 is coupled to pivoting portion 26. Pivoting portion 26 is generally circular or spherical in shape and has bubble mechanism 48 coupled thereto. However, pivoting portion 26 and main portion 24 can be any configuration or shape desired.

[0028] As shown in Figs. 5 and 6, pivoting portion 26 has a slot or opening 50 that extends along the portion 52 of pivoting portion that faces away from the main portion 24 to a portion 54 that faces down in the direction toward the base. Bubble mechanism 48 is positioned within slot 50 and is adapted to pivot from a first position 56 adjacent portion 52 to a second position 58 adjacent portion 54.

[0029] As shown in Figs. 2 and 3, bubble mechanism 48 preferably has three struts 60a, 60b and 60c extending through slot 50 to bubble forming mechanism 62. Struts 60a-c and bubble forming mechanism are preferably formed from plastic, but can be any suitable material. Bubble forming mechanism 62 is preferably substantially ring-shaped having opening 64 therein (Fig. 6). Opening 64 is defined by an inner surface 66 having a first or inner diameter 68. Mechanism 62 also has an outer surface 70 with a second or outer diameter 72. Second diameter 72 is preferably greater than first diameter 68. It is noted that the bubble forming mechanism can be any shape or configuration suitable.

[0030] As shown in Figs. 1 and 6, main portion 24 has a basin or receptacle 74 hingedly connected thereto by support arm 76. Support device 76 is preferably a plastic arm that extends from the main portion to the receptacle 74. Receptacle 74 is

preferably a plastic substantially cylindrical or circular cup having an inner wall 78 and an outer wall 80 and a bottom 82. If desired receptacle 74 can have a lid (not shown) that can be removably attached to at least one of walls 78 and 80. The lid would significantly reduce inadvertent spilling of any fluid therein, while allowing the bubble producing mechanism 62 access to the fluid held within receptacle 74. Support device 76 and receptacle 74 are preferably sized and configured to position the receptacle underneath of pivoting portion 22. Support device 76 is adapted to move from a first position 84 (Fig. 5), wherein the bubble producing mechanism 62 is positioned within the receptacle 74 to a second position 86 (Fig. 6), where the bubble producing mechanism 62 is positioned away from the receptacle 74. Support device 76 can be protected by a plastic cover 85, as shown in Fig. 2; however cover 85 is not necessary.

[0031] As shown in Fig. 3, battery pack or compartment 32 is generally rectangular and is positioned within the base portion 18. Electrical wires 88 extend from battery pack 32 to electrical switch 35.

[0032] Handle 20 houses reservoir tank or chamber 90, lever arm 92 and heating element 94. Reservoir tank or receptacle 90 is preferably formed of a flexible or compressible plastic or rubber material and is generally elliptical in shape. However, reservoir 90 can be formed of any suitable material and have any configuration desired. Reservoir 90 is preferably positioned within handle 20 such that end 94 of lever arm 92 is adjacent the area of the reservoir having the largest diameter.. This allows nozzle 96 to extend through the housing, allowing access into reservoir 90. Nozzle 96 preferably defines a channel or opening 97 into reservoir 90 for filling reservoir 90 with a suitable fluid. Nozzle 96 preferably has a cap or stopper 98 plugging the opening 97, thereby effectively closing or sealing the reservoir from the external atmosphere. It is noted that the reservoir 90 does not necessarily need to be positioned in the handle 20 as specifically described and can be positioned in any suitable manner. For example, the reservoir 90 does not necessarily need to be positioned with the lever arm 92 at the portion with the largest diameter, and can be positioned relative to the lever arm in any suitable manner.

[0033] At end 100 of reservoir 90, heating member or element 94 extends into reservoir 90 through an opening 102. As shown in Figs. 3 and 4, heating element 94 is

formed from a metal outer tube 104 substantially radially enclosing a glass element 106. Metal tube 104 is preferably a substantially cylindrical hollow tube with a length and an inner diameter and an outer diameter. Glass element 106 preferably is substantially cylindrical and encases a coiled metal resistance wire 108. The resistance wire is coiled around a middle portion 110 that is encased by a top portion 112 and a bottom portion 114. The heating element has a first mounting member 116 and a second mounting member 118 that are adapted to position the heating element in the reservoir 90.

[0034] The glass element has an outer diameter that is less than the inner diameter of tube 104. More specifically, an outer diameter of the glass element is configured such that a space exists between at least a portion of the glass element outer surface and the metal tube inner surface. Additionally the glass element has a length that is greater that the metal tube.

[0035] Heating element 94 has a first electrical wire 120 and a second electrical wire 122 coupled thereto. The first electrical wire 120 is coupled to the end distal to the opening 102, and the second wire 122 is coupled to the end proximal or adjacent the opening 102. Wire 120 and 122 are electrically coupled to a power source, preferably the battery compartment 32; however, the wires 120 and 122 can be electrically coupled to any power source desired.

[0036] Positioned behind disk 138 is a variable fan (not shown). The fan is electrically coupled to the battery compartment 32, or any other electrical source, and can vary its rotational velocity. The fan is adapted to blow air, smoke, fog, vapor or any combination thereof or any other fluid though tube 139, into tube 141 and past bubble forming mechanism 62. By varying the speed or velocity of the fan, the velocity of any fluid that passes through the fan can be varied, and thus the size of the bubbles and rate at which bubbles can be produced can be varied. The fan can be coupled to any type of device, such as a trigger or switch that would allow the user to vary the speed of the fan motor.

[0037] As shown in Figs. 1-3, there are a series of levers, linkages and rotatable discs that function together to operate gun 10. Preferably, trigger or lever arm 42 extends from an internal portion of the gun 10 through opening or slot 124 in the housing 12. If desired a particle trapping device, such as a series of bristles (not

shown) can be positioned within opening 124. Such bristles would prevent smoke or vapor from escaping from the gun 10, and also trap dirt and dust, while allowing air to enter the internal portion of the housing and simultaneously allowing lever arm 42 to move from first position 44 to second position 46.

[0038] Lever arm 42 rotates around pivot point 126. End 128 of lever arm 42 abuts end 130 of linkage 132. Linkage 132 is adapted to pivot around pivot point 136. Linkage 134 is then connected to disk 138 and end 140. Disk 138 is adapted to rotate about center point 142. Approximately 180 degrees from end 140, linkage 144 is coupled to disk 138 at end 146. Linkage 144 is coupled to disk 148 at end 150, and disk 148 is adapted to rotate about center point 152. Bubble mechanism 48 is then connected to disk 148.

[0039] Additionally, disk 138 has a protrusion or an abutment 154 extending therefrom. Abutment 154 is adapted to contact lever arm 156, which in turn causes cam 158 to rotate about pivot point 160. Pivoting cam 158 rotates arm 162, which contacts arm 164, which is connected to linkage system 165. Linkage system is coupled to receptacle 74 and is adapted to move the receptacle toward and away from bubble mechanism 48.

[0040] Furthermore, cam 158 has lever arm 166 extending therefrom, which is adapted to contact lever arm 168. Lever arm 168 is adapted to pivot about pivot point 170, thereby moving lever arm 92 and end 94. As described above, end 94 is preferably adjacent or abutting reservoir 90.

[0041] LED 174 is visible though the main portion of housing 12 and is electrically connected to battery compartment 32. LED 174 is preferably lit when the switch 35 is in the on position.

Operation

[0042] As illustrated in Figs. 1-8, toy bubble gun ten operates in the following manner. Stopper 98 for reservoir 90 is removed allowing access to reservoir 90. A fluid 91 capable of producing smoke or vapor when heated is preferably inserted or poured into reservoir 90. For example, FOG JUICE or any other suitable product could be used, which can vary in color and/or scent (e.g., the smoke can appear as any color in the visible spectrum). The stopper 98 is then replaced to form a closed system.

[0043] The battery door 30 is removed to expose the inside portion of battery compartment 32. Preferably batteries are positioned therein; however, the power source for the gun 10 can be any suitable power supply. Switch 35 is then moved into the on position, at which time the heating element heats up. The powering up of the toy also includes starting of the fan.

[0044] It is noted that to preserve energy and/or battery life, the gun can have an energy on demand system. This system can be electrical (i.e., controlled by a microprocessor or other electrical system) or mechanical (i.e., perform certain functions in response to lever arm actions). In any configuration, the system would have stages of operation. For example, upon turning the gun on, the heating element would begin to heat up. At this time, the fan would not be in operation. Once the heating element was sufficiently hot to turn the liquid into vapor, the fan could be activated.

[0045] Generally, to begin the process, the lever 42 is in the first position 44, which through the linkage system and lever arms positions the bubble mechanism 62 within the receptacle 74. Since receptacle 74 is preferably bowl shaped, a liquid can be held therein. Preferably any bubble producing liquid can be used. For example, general liquid soap can be used. The liquid preferably forms a film across the opening 64 of the bubble mechanism 62, as is generally known in the bubble producing art.

[0046] As lever arm 42 is moved toward the second position, two things happen, substantially simultaneously. First lever arm causes the series of linkages and lever arms to bias or move the lever arm 92 in the direction of reservoir 90. Since reservoir 90 is flexible, lever arm 92 compresses the reservoir 90, thereby decreasing the interior volume thereof. This decrease in volume forces fluid 91 up through the heating element 94 (i.e., between the metal tube and the glass element). Since the glass element has been heated, this causes the fluid to turn to smoke or vapor.

[0047] The second action that occurs is that the series of lever arms and linkages causes disk 148 to rotate in a clockwise direction (as shown in Fig. 3). This rotation brings the bubble mechanism up parallel to the base 18. Also, the series of linkages and lever arms move the receptacle 74 in a downward direction, away from the pivoting portion 26.

[0048] The fan begins to suck or draw the smoke from the handle into the blades of the fan, and tube 141 and tube 139 align to form a single passageway. The fan then pushes the smoke through tubes 139 and 141. It is noted that air from the gun preferably enters the interior of the housing through the opening 124 or simply through the open portions of the housing. This air helps cool portions of the gun, such as the heating element and the fan and also mixes with the smoke to produce an air/smoke combination.

[0049] The smoke or air/smoke combination travels through the bubble mechanism 48 forming bubbles having smoke and/or air trapped or encased therein. As discussed above, the fan can have a variable speed motor, which would allow varying sized bubbles and various rates at which bubbles are produced. For example, the fan could operate between speeds that would allow only one large bubble to be produced or a stream of bubbles to be produced.

[0050] Any direction (such as up, down, left, right, clockwise, counterclockwise, etc.) described herein is used solely for exemplary purposes and is not meant to limit the invention.

Embodiment of Fig. 9

[0051] Fig. 9 illustrates a second embodiment 200 of the reservoir for the smoke fluid and the heating element. Specifically, the embodiment of Fig. 9 has a fog solution reservoir tank or receptacle 210 that is in fluid communication with bellows 212. The smoke or fog solution 91 is initially introduced into the receptacle 210 through as nozzle (not shown), similar to nozzle 96. Reservoir 210 has a first opening or air inlet 214, a second opening 216 and a third opening 217. The second opening has a first conduit or pipe 218 inserted therein that extends into reservoir 210, such that fluid can enter the conduit 218.

[0052] Conduit 218 preferably has a one way check valve 220 that only allows fluid to travel in the direction of arrow 222. End 224 of conduit 218 enters first opening 226 of bellows 212. Bellows 212 has a second opening 228 with a second conduit or pipe 230 extending therefrom. End 232 of conduit 230 extends into bellows 212 in such a manner as to allow fluid to enter conduit 230. Conduit 230 has a one way check valve 231 that only allows fluid to travel in the direction of arrow 232.

[0053] Conduit 230 extends to and is in fluid communication with a chamber 234 that houses heating element 236. Heating element 236 is preferably a MICA tube having a resistance wire 238 coiled therearound. The resistance wire is prefereably electrically connected to a power source such as the battery compartment 32.

[0054] Chamber 234 also has an opening 239 that is in fluid communication with fan 240 and an opening 242 that is in fluid communication with reservoir 210 through conduit 244 that extends through opening 217. Conduit 244 has a one way check valve 246 that only allows fluid to travel in the direction of arrow 248.

[0055] Additionally, fan housing 250 can have a drain valve 252 therein to allow any condensation to drain from the housing.

[0056] In operation, when lever arm 42 is moved to first position 44, lever arm 254 moves in the direction of arrow 256. This movement expands baffles 214, which draws or sucks fluid from reservoir 212 into the baffles. Then as the lever arm 42 is moved from the first position to the second position, the lever arm 254 contracts or compresses baffles 214. This compression forces the fluid through conduit 230 and into the chamber 234. The fluid contacts the heating element 236, which in turn heats the fluid causing the fluid to turn to smoke, The smoke in then drawn into the fan 240. Any excess fluid returns to reservoir 212 via conduit 244.

[0057] This embodiment is simply used in place of reservoir 90 and heating element 94, and any other description of the gun or operation thereof is applicable to this embodiment.

[0058] It should be understood that various changes and modifications to the presently preferred embodiments described herein will be apparent to those skilled in the art. Such changes and modifications can be made without departing from the spirit and scope of the present invention and without diminishing its intended advantages. It is therefore intended that such changes and modifications be covered by the appended claims.